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ABSTRACT

One Teaching Laboratory (TL) task, a component concerned with several behaviors related to classroom questioning, was developed and tested. Subjects were 86 teacher candidates enrolled in four sections of an introductory teaching course. Two experienced instructors each taught two sections, one section utilizing the TL component and the other not. Identical numbers of TL and non-TL Ss (N-43) participated in four 2-hour class sessions. The TL treatment, using specifically prepared TL manual, evaluation forms, and listening guide), consisted of presentation of questioning strategy concepts and participation in a microteaching cycle: Ss taught a lesson, evaluated and discussed it, and retaught it. The non-TL treatment consisted of presentation of the questioning strategy concepts and of Bloom's "Taxonomy"; an educational game called "Questicnize"; and teaching a microteaching lesson. Audio tapes of microteaching lessons of all Ss on the final day constituted the data source. The 24-category Questioning Strategies Observation System (QSOS) was used to code and analyze tapes. Multiple linear regression procedures were employed. Findings indicate that the TL treatment was more effective than the non-TL in influencing candidates (1) to ask more questions of a cognitive rather than affective or procedural nature and (2) to react to pupils' responses to questions in a more positive (accepting, supporting) manner. (Implications are discussed.) (JS)

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THE EFFECTIVENESS OF TEACHING LABORATORY INSTRUCTION ON THE QUESTIONING BEHAVIORS OF BEGINNING TEACHER CANDIDATES

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The Effectiveness of Teaching Laboratory Instruction on the Questioning Behaviors of Beginning Teacher Candidates[1,2]

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Teaching laboratory components, based on microteaching rationale, have been found to be effective in changing teacher candidates' teaching behaviors (e.g., Allen and Ryan, 1969; Davis and Smoot, 1969). The Teaching Laboratory (TL) requires active involvement of the candidate in conceptualizing, practicing, and reviewing his personal behaviors on specific, realistic teaching tasks or "skills." (Davis and Gregory, 1969). Although TL procedures have been found generally effective, a concern of central importance must be the development and empirical test of individual TL tasks.

Pedagogic tasks, to which candidates must direct their attention in a TL program, initially seem to have been developed because of the belief of knowledgeable teacher educators that these tasks were important and trainable dimensions of

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the teaching act. Consequently, several sets of TL tasks have been developed (e.g., Allen and Ryan, 1969; Emmer and Millett, 1970; TL staff, 1968), some of which have received empirical test and others have not. The present study reports the development and test of one TL task, a component concerned with classroom questioning.

Teaching behaviors including and associated with questioning seem common to most teachers in all teaching fields at all educational levels. Records of teacher behavior, witnessed and written about since the time of Socrates, invariably include some mention of questioning and the manner by which the teacher conducts this activity. Over half a century ago, in his influential report on classroom practices, Rice (1893) commented on the teacher's frequent use of "recitation" as a means of accomplishing educational goals. A number of reports (e.g., Bellack and others, 1966; Flanders, 1965) have concluded that a major activity of teachers consisted of asking and reacting to questions. Not only do teachers rely heavily on the use of questions in teaching, their questions tend to be focused on the recall of facts and information and seldom demand higher levels of thinking on the part of pupils (Adams, 1964; Davis and Tinsley, 1967; Floyd, 1960; Guzak, 1967; Stevens, 1912).

Several recent studies report results of efforts to change teacher questioning practices. Elementary school student teachers who came to understand cognitive levels of questions, according to the Bloom (1956) system, subsequently asked more higher order questions (Clegg and others, 1967; Rogers, 1969). Also, Taba (1966) found that experienced teachers trained in a special questioning

strategy asked more higher order questions than did untrained teachers. Micro-teaching procedures, employing perceptual or symbolic models, have been found productive in raising the use of higher-order questions by secondary teacher candidates (Berliner and others, 1967).

The present study, as a consequence, was directed to the change, using a TL context, of several teacher behaviors related to classroom questioning. It continues a series of investigations of teachers' questioning practices (Davis and others, 1969). Additionally, it is one inquiry in a program of research and development activities focused on examination and expansion of laboratory teaching in pre-service teacher education.

Procedure

Subjects

Subjects were 86 mostly junior level secondary teacher candidates enrolled in four sections of the introductory course in teaching in the professional sequence at The University of Texas at Austin. Two experienced instructors each taught two sections of the course and each taught one section involving the TL component and another section not utilizing the TL component, each assigned at random to the treatment. In the two treatment conditions, TL and non-TL, identical numbers of Ss participated (N = 43). In the TL combined group were 34 female and nine male Ss; in the non-TL group were 38 female and five male Ss. The study was conducted during a two week period beginning the second week of the Spring semester, 1969. During this experimental period, Ss were involved in four class sessions each of approximately two hours duration.

Teaching Laboratory Treatment

At the first class meeting, instructors introduced questioning as a useful strategy to be used in teaching, distributed copies of a specially prepared TL manual, "Questioning as a Classroom Strategy" (Morse, 1969), and clarified and expanded concepts presented in the manual and in the assigned readings. The instructors personally demonstrated several of the tactics involved in a questioning strategy and answered student questions concerning the use of questioning. Instructors then assigned students the task of teaching a ten-minute lesson to peers in the Teaching Laboratory during the next class meeting (two days later). They pointed out that the purpose of the laboratory teaching was to give candidates an opportunity to develop a questioning strategy in teaching a topic from their own teaching field and to give candidates an opportunity to practice as many tactics of questioning as possible in a simulated teaching situation.

After assigning the "teach," instructors explained the use of a specially prepared evaluation form and listening guide. The evaluation form was designed to focus peer attention to specific aspects of the teaching strategy used; it was to be completed subsequent to each candidate's teach and to be given to the student doing the "teach" as one means of feedback. The listening guide was designed to be used by the candidate doing the teach as he listened to the audio-taped replay of his teach to help him identify specific behaviors used in his strategy.

Following the assignment of the teach and the explanation of the evaluation form and listening guide the instructor demonstrated the use of tape recorders and gave students the opportunity to use them before dismissing the class.

On the second class day, the TL sections were divided into four groups of equal size for completing the TL teaches. Each student taught a TL lesson (ten-minutes in length) using a questioning strategy. This lesson was audio tape-recorded. Candidates' peers served as pupils and completed the evaluation form following each teach. Candidates were reminded that they were responsible for listening to their teaches with the aid of the listening guide before the next class period (four days later).

The third class was devoted to discussion of the kinds of behaviors observed by the instructor and by candidates which needed alteration in order to be a more effective part of questioning strategies. In discussing the teaches, frequent reference was made by the instructors to the TL manual and the assigned readings. The direction of discussion was a function primarily of each instructor's perception of group needs based on observation of the teaches and varied for the two groups accordingly. Subsequent to discussion, the instructor assigned a reteach TL lesson to emphasize the use of a variety of tactics and seeking higher levels of questions. The reteach was to be conducted two days later.

The final class session for the TL group was devoted to "reteaches". Candidates again taught a ten-minute lesson to the same group of peers. The TL lesson was again audio tape-recorded.

Non-Teaching Laboratory Treatment

The first class session for the non-TL sections included a general introduction to questioning as a teaching strategy similar to the one received by the TL groups at their first session. Following the introduction of

questioning, the instructors presented information and led a class discussion about Bloom's (1956) Taxonomy as it related to the strategy of classroom questioning.

The second and third class sessions for the non-TL group primarily were devoted to playing an educational game called Questioneze (Smith and others, 1969). This game was designed to facilitate the learning of the Bloom Taxonomy and to modify questioning behaviors. At the completion of the game on the third day, candidates were familiarized with the tape recorder, assigned to teach a TL lesson emphasizing higher levels of questions and a variety of tactics relating to questioning.

The fourth session for the non-TL group was devoted to teaching ten-minute lessons to peers in the same manner as that of the TL group. These lessons also were audio tape-recorded.

Data Collection and Analysis

The audio tape-recorded TL lessons of all Ss on the final day of the study constituted the data source for this inquiry. The criterion measure employed was the Questioning Strategies Observation System (QSOS). This 24 category instrument, developed by Morse and Davis (1969), yields seven derived scores: question quantity, cognitive quantity, cognitive quality, tactical versatility, question success, reaction quality, and cognitive versatility. The reliability (Scott, 1955) of three coders, following training to use the QSOS, ranged from .66--.74 for the 24 categories and from .91--.94 for the seven derived measures. Obtained data were treated by multiple linear regression procedures employing a

program developed from Jenning's (1967) basic pattern for use on the CDC 6600 computer at The University of Texas at Austin.

Results

Table 1 presents means and SDs of both treatment groups on the seven questioning behavior measures. A summary of the analysis of these measures is displayed as Table 2. Of the seven contrasts, two were statistically significant. These findings indicate that the TL treatment was more effective than the non-TL treatment a) in influencing candidates to ask more questions of a cognitive rather than affective or procedural nature and b) in influencing candidates to react to pupils' responses to questions in a more positive manner (e.g., accepting, supporting) rather than a negative way (e.g., rejecting, criticizing).

Discussion

The effectiveness of the Teaching Laboratory to alter certain questioning behaviors of beginning teacher candidates is attested by these findings. Of particular importance is the fact that the obtained significant behavior changes were manifest following only a two-week instructional period. That these differences occurred is important, yet explanation of these results is complicated.

In the TL context, candidates had the opportunity to "try out," to review and reflect, and to practice their personal behaviors involved in the TL task on questioning. Since one of the stated objectives of the TL teach-reteach cycle was to use questions of a cognitive nature, the initial teaching encounter

along with the feedback provided by peers, from listening to the audio-recording of the lesson, and class discussion probably were of sufficient impact to focus candidates' attention to cognitive questions. Consequently, they reduced the proportion of questions devoted to classroom procedure and to affect.

The difference in reaction quality may be attributed simply to the TL confrontation. On the other hand, other explanations are plausible. Particularly during the feedback sessions, candidates may have learned at a behavioral level that positive reactions facilitated the questioning interchanges. Another possibility is that working with peers as TL pupils increased the amount and degree of personalization in the feedback afforded candidates. Too, being a TL pupil may have been productive of increased perceptions by candidates of how their own teaching may have appeared to pupils whom they taught. Conversely, peers as pupils may have served to increase dependency of candidates on one another, thereby fostering increased attention to pupil responses in the laboratory setting. Quite obviously, possible explanations of the obtained results merit specific investigation.

Noteworthy, especially in light of some previous research, is the failure to note significant differences in additional dimensions of classroom questioning, especially in the measures of question quantity and cognitive quality. Simply put, Ss in both treatments asked non-dissemilar numbers of questions. Neither treatment gave importance to the number of questions asked in teaching. That is, any implicit "ideal" of questioning did not include many questions rather than few questions. Since questioning was the concern of both groups, the general

instructional cue was to question and, apparently, Ss in both groups attended to this concern.

The finding of a non-significant difference in question quality is not entirely compatible with other findings. Two explanations are asserted as reasonable. In most other studies (e.g., Davis and Tinsley, 1967; Rogers, 1969), the unit of analysis has been a score derived from the observances of questions categorized in specific classifications (e.g., memory, evaluation). In the present study, cognitive quality was a score derived by assigning weights to each cognitive category and summing over categories for the observation. As a result, the obtained score may have obscured differences that would have been detected by another analysis. Another explanation is rooted in the length of time involved in the study and in the TL instructional sequencing. In a micro-teaching context, Claus (1969) noted increased numbers of higher-order questions as a function of modeling procedures employed. Those results were obtained in an experiment conducted over a variable period of days for Ss. That experiment required Ss to teach four ten-minute TL-type lessons, to observe two ten-minute models, and to self-view two of the Ss' personally taught video-taped lessons. This use of time clearly was more extensive for each S than was the time employed in the present study. Here, each S in the TL treatment taught two ten-minute lessons, listened to an audio tape-recording of one of them, and did not listen to any model tapes, all over a two week period.

Particularly in view of the Claus (1969) sutdy, research must be directed toward various dimensions of the TL procedure used here. Perhaps addition of

perceptual and/or symbolic models in conjunction with the TL manual would increase the TL effectiveness. Consideration might also be given to restructuring the task into several sub-tasks rather than one largely undifferentiated task. The nature of the feedback received by candidates (e.g., recorded or unrecorded, cued or not cued, supervisory or non-supervisory) also seems worthy of continued study. As inquiry proceeds on such problems, the effectiveness of the Teaching Laboratory on the task of classroom questioning seems likely to be enhanced.

Two outcomes, in addition to the findings discussed, are central to this research enterprise. First, a TL task, developed and empirically tested, is available for use in teacher education programs. Further, suggestions for revision of the task and the TL procedures have been generated. Second, a pattern of research and development of TL tasks has been illustrated.

Table 2

Summary of Analysis of Covariance for Treatment Effects*

	DF1	DF2	F	Probability	Direction of Difference
Question Quantity	1	7S	.074	.785	Non-TL
Cognitive Quantity	1	79	6.658	.011	TL
Cognitive Quality	1	79	.000	.994	TL
Tactical Versatility	1	79	.015	.902	Non-TL
Question Success	1	79	.151	.698	TL
Reaction Quality	1	79	8.885	.003	TL
Cognitive Versatility	1	79	.536	.466	TL

*This table is based on the use of a multiple linear regression model.

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